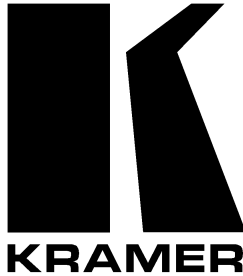


Kramer Electronics, Ltd.



USER MANUAL

Models:

TP-104, XGA Line Transmitter / DA

TP-105, CAT5 Line Driver / DA

TP-121, XGA / Audio Line Transmitter

TP-122, XGA / Audio Line Receiver

TP-123, XGA / Audio / Data Line Transmitter

TP-124, XGA / Audio / Data Line Receiver

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1 Introduction

Welcome to Kramer Electronics (since 1981): a world of unique, creative and affordable solutions to the infinite range of problems that confront the video, audio and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 350-plus different models now appear in 8 Groups¹, which are clearly defined by function.

Congratulations on purchasing your Kramer TOOLS: **TP-104 XGA Line Transmitter / DA**, and/or **TP-105, CAT5 Line Driver / DA**, and/or **TP-121 XGA / Audio Line Transmitter**, and/or **TP-122 XGA / Audio Line Receiver**, and/or **TP-123, XGA / Audio / Data Line Transmitter**, and/or **TP-124, XGA / Audio / Data Line Receiver**, which are ideal for:

- Presentation and multimedia applications
- Long range graphics distribution for schools, hospitals, security, and stores

The package includes one or more of the following Kramer TOOLS:

- **TP-104, TP-105, TP-121, TP-122, TP-123, or TP-124**
- Power adapter (12V DC Input) and this user manual²

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables³

3 Overview

This user manual describes the following Kramer TOOLS products:

- **TP-104 XGA Line Transmitter / DA**, which is a line transmitter / 1:4 DA that receives an XGA signal and transmits it over 4 CAT5 cables to appropriate receivers, see section 4
- **TP-105 CAT5 Line Driver / DA**, which receives a CAT5 input, and distributes it to 2 identical outputs, see section 5

1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers; and GROUP 8: Cables and Connectors

2 Download up-to-date Kramer user manuals from the Internet at this URL: <http://www.kramerelectronics.com>

3 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

- **TP-121** *XGA / Audio Line Transmitter* and the **TP-122** *XGA / Audio Line Receiver*, see section 6
- **TP-123** *XGA / Audio / Data Line Transmitter* and the **TP-124** *XGA / Audio / Data Line Receiver*, see section 7

Achieving the best performance means:

- Connecting only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoiding interference from neighboring electrical appliances
- Positioning your Kramer TOOLS away from moisture, excessive sunlight and dust

In applications with high interference, shielded twisted pair (STP) cable will give better results.

4 Your TP-104 XGA Line Transmitter / DA

The **TP-104** is a line transmitter / 1:4 DA that receives an XGA signal¹ and transmits it over 4 CAT5 cables to appropriate receivers. In particular, the **TP-104**:

- Has a video bandwidth of more than 150MHz, with a transmission range of more than 300 ft. (more than 100 meters)
- Can power or be powered by the receiver over the same CAT5 cable
- Is 12VDC fed

Figure 1 and Table 1 define the **TP-104**:

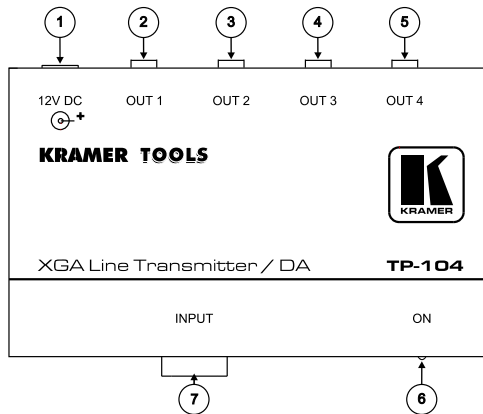


Figure 1: TP-104 XGA Line Transmitter / DA

Table 1: TP-104 XGA Line Transmitter / DA Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	OUT 1 RJ-45 Connector	Connects to ² the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver or the TP-120 XGA Line Receiver ³
3	OUT 2 RJ-45 Connector	Connects to ² the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver or the TP-120 XGA Line Receiver ³
4	OUT 3 RJ-45 Connector	Connects to ² the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver or the TP-120 XGA Line Receiver ³
5	OUT 4 RJ-45 Connector	Connects to ² the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver or the TP-120 XGA Line Receiver ³
6	ON LED	Illuminates when receiving power
7	XGA INPUT HD15F Connector	Connect to the XGA source

1 The terminology XGA is used throughout this manual, where this implies any RGBHV signal on an HD15 connector having a resolution from VGA up to XGA

2 Using a UTP CAT5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 8 and Figure 9)

3 Refer to the separate user manual: PT-110, WP-110, TP-120, which can be downloaded from the Internet at this URL: <http://www.kramerelectronics.com>. Also, see the example illustrated in Figure 12

5 Your TP-105 CAT5 Line Driver / DA

The **TP-105** receives a CAT5 input, and distributes it to 2 identical outputs. In particular, the **TP-105**:

- Has a transmission range of more than 300 ft. (more than 100 meters) over UTP cabling
- Includes EQ. and level controls
- Is 12VDC fed

Figure 2 and Table 2 define the **TP-105**:

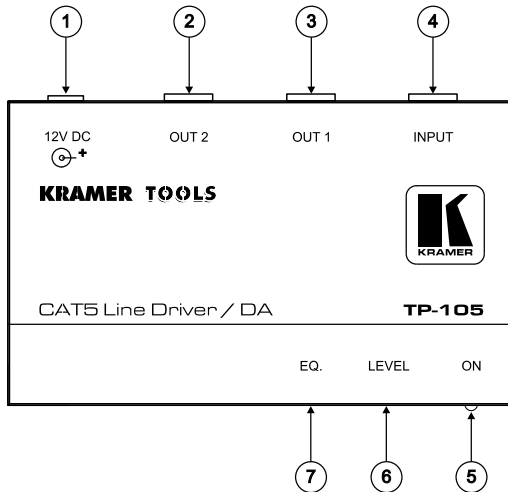


Figure 2: TP-105 CAT5 Line Driver / DA

Table 2: TP-105 CAT5 Line Driver / DA Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	OUT 2 RJ-45 Connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-120 XGA Line Receiver
3	OUT 1 RJ-45 Connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-120 XGA Line Receiver
4	INPUT RJ-45 Connector	Connects to ¹ the LINE OUT RJ-45 connector on the PT110 XGA Line Transmitter
5	ON LED	Illuminates when receiving power
6	LEVEL Trimmer	Adjusts ² the video signal level
7	EQ. Trimmer	Adjusts the video EQ. (equalization) compensation

1 Using a UTP CAT5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 8 and Figure 9)

2 Insert a screwdriver into the hole and carefully rotate it, to trim the level

6 Your TP-121 / TP-122

This section defines the **TP-121 XGA / Audio Line Transmitter** (see section 6.1), and the **TP-122 XGA / Audio Line Receiver** (see section 6.2).

6.1 Your TP-121 XGA / Audio Line Transmitter

The **TP-121** is an XGA / audio stereo line transmitter that receives an XGA signal and an unbalanced stereo analog audio signal and transmits them over CAT5 cable to a **TP-122** receiver, converting the unbalanced stereo analog audio signal to digital audio (S/PDIF) stream before transmitting, thus preserving the quality of the audio signal. In particular, the **TP-121**:

- Has a 350MHz video bandwidth, with a transmission range of more than 300 ft. (more than 100 meters), and a 20kHz audio bandwidth with an S/N ratio that exceeds 80dB on the same transmission range
- Can power or be powered by the receiver over the same CAT5 cable
- Is 12VDC fed

Figure 3 and Table 3 define the **TP-121**:

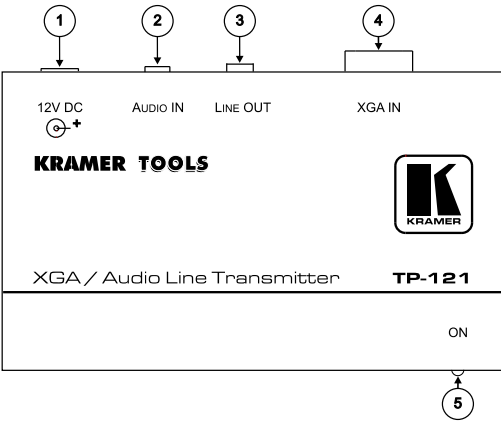


Figure 3: TP-121 XGA / Audio Line Transmitter

Table 3: TP-121 XGA / Audio Line Transmitter Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	AUDIO IN 3.5mm Mini Jack	Connects to the audio source
3	LINE OUT RJ-45 Connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver
4	XGA IN HD15F Connector	Connect to the XGA source
5	ON LED	Illuminates when receiving power

¹ Using a UTP CAT5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 8 and Figure 9)

6.2 Your TP-122 XGA / Audio Line Receiver

This section describes the topside (see section 6.2.1), and the underside¹ (see section 6.2.2) of the **TP-122 XGA / Audio Line Receiver**.

6.2.1 Your TP-122 XGA / Audio Line Receiver (Topside)

The **TP-122** is an XGA / audio line receiver that receives the coded CAT5 signal transmitted by a **TP-121**, decodes it and converts it to XGA, stereo analog and S/PDIF digital audio outputs. The **TP-122**, with a **TP-121**, allows an operation range of more than 300 ft. (more than 100 meters) over standard CAT5 cable. In addition, the **TP-122**:

- Can power or be powered by the transmitter over the same CAT5 cable
- Can change the polarity of decoding H and V Sync for video
- Includes EQ. and level controls
- Is 12VDC fed

Figure 4 and Table 4 define the **TP-122 XGA / Audio Line Receiver** topside:

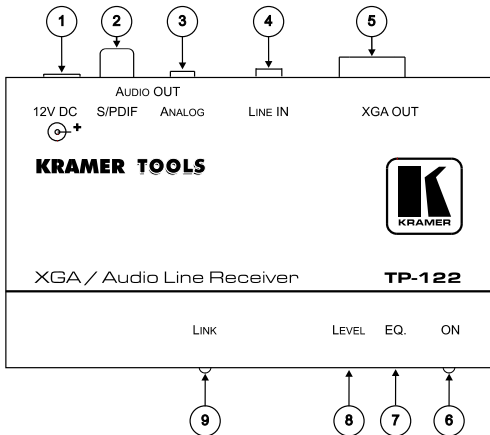


Figure 4: TP-122 XGA / Audio Line Receiver (Topside)

¹ The underside is identical on the TP-122 and TP-124

Table 4: TP-122 XGA / Audio Line Receiver (Topside) Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	AUDIO OUT	S/PDIF RCA connector
3		ANALOG 3.5mm Mini Jack
4	LINE IN RJ-45 Connector	Connects to ¹ the <i>LINE OUT</i> RJ-45 connector on the TP-121 XGA / Audio Line Transmitter or TP-104 XGA Line Transmitter / DA
5	XGA OUT HD15F Connector	Connects to the XGA acceptor
6	ON LED	Illuminates when receiving power
7	EQ. ² Trimmer	Adjusts ³ the cable compensation equalization level
8	LEVEL Trimmer	Adjusts ³ the output signal level
9	LINK LED	Illuminates when receiving the correct input signal

6.2.2 Your TP-122 XGA / Audio Line Receiver (Underside)

Figure 5 and Table 5 define the underside⁴ of the **TP-122 XGA / Audio Line Receiver**:

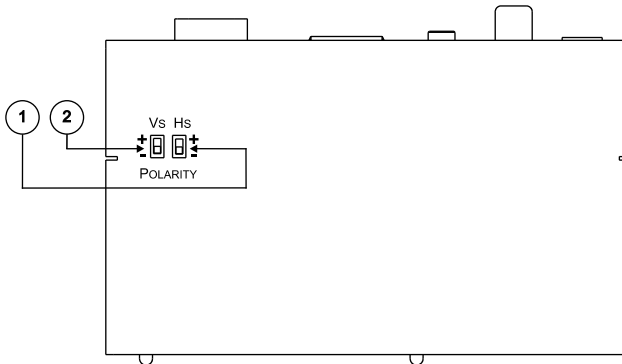
Figure 5: TP-122 XGA / Audio Line Receiver (Underside⁴)

Table 5: TP-122 XGA / Audio Line Receiver (Underside) Features

#	Feature	Function
1	HS Switch	Slide the switch up ⁵ , to set the H SYNC to positive polarity; slide the switch down, to set the H SYNC to negative polarity
2	VS Switch	Slide the switch up ⁵ , to set the V SYNC to positive polarity; slide the switch down, to set the V SYNC to negative polarity

1 Using a UTP CAT5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 8 and Figure 9)

2 Degradation and VGA/XGA signal loss can result from using long cables (due to stray capacitance), sometimes leading to a total loss of sharpness in high-resolution signals

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

4 The underside is identical on the TP-122 and TP-124

5 By default, both switches are set down (for a negative V SYNC and H SYNC polarity)

7 Your TP-123 / TP-124

This section describes the **TP-123 XGA / Audio / Data Line Transmitter** (see section 7.1), and the **TP-124 XGA / Audio / Data Line Receiver** (see section 7.2).

7.1 Your TP-123 XGA / Audio / Data Line Transmitter

The **TP-123** is a high performance transmitter that accepts a computer graphics input signal, an unbalanced stereo analog audio signal, unidirectional (RxD) RS 232 control commands and 12V DC power, over CAT5 cable, and transmits to a **TP-124** receiver. The stereo analog audio signal is converted to the digital audio (S/PDIF) stream before transmitting, thus preserving the quality of the audio source signals.

The **TP-123 / TP-124** pair has a transmission range of more than 300 ft. (more than 100 meters) over UTP cabling. In addition, the **TP-123**:

- Has video bandwidth that exceeds 350MHz
- Can power or be powered by the **TP-124** receiver over the same CAT5 cable
- Is 12VDC fed

Figure 6 and Table 6 define the **TP-123**:

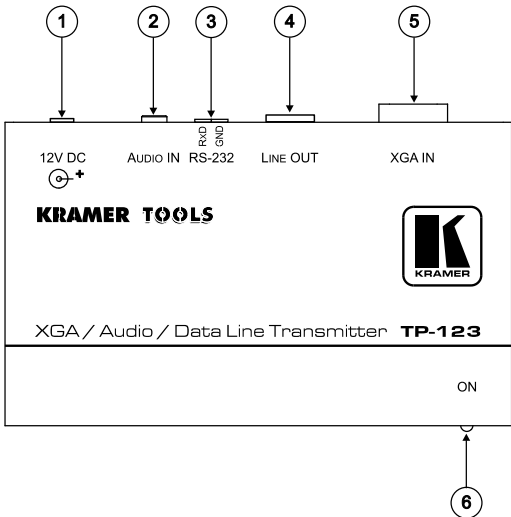


Figure 6: TP-123 XGA / Audio / Data Line Transmitter

Table 6: TP-123 XGA / Audio / Data Line Transmitter Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	AUDIO IN 3.5mm Mini Jack	Connects to the audio source
3	RS-232 Terminal Block Connector	Connects to the PC or the Remote Controller (see section 9.1)
4	LINE OUT RJ-45 Connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver
5	XGA IN HD15F Connector	Connect to the XGA source
6	ON LED	Illuminates when receiving power

7.2 Your TP-124 XGA / Audio / Data Line Receiver

The **TP-124** is a high performance receiver obtaining the computer graphics signal/audio/control data from the Kramer **TP-123** via UTP cabling at its CAT5 Line input. The **TP-124** outputs a computer graphics signal, an unbalanced stereo analog audio signal, a converted digital audio (S/PDIF) signal and RS-232 control commands. The unidirectional (TxD) RS-232 interface makes it possible to control virtually any devices over a transmission range of more than 300 ft. (more than 100 meters) over UTP cabling. The **TP-124** can power or be powered by the **TP-123** transmitter over the same CAT5 cable.

In addition, the **TP-124** features:

- Level and EQ. control for the XGA signals
- The capability to change the polarity of decoding H and V Sync
- 24 bit 48kHz S/PDIF digital audio that supplies the highest quality audio
- Is 12VDC fed

This section describes the topside of the **TP-124 XGA / Audio / Data Line Receiver**. The underside² of the **TP-124** is described in section 6.2.2.

¹ Using a UTP CAT5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 8 and Figure 9)

² The underside is identical on the TP-124 and TP-122

Figure 7 and Table 7 define the topside of the **TP-124 XGA / Audio / Data Line Receiver**:

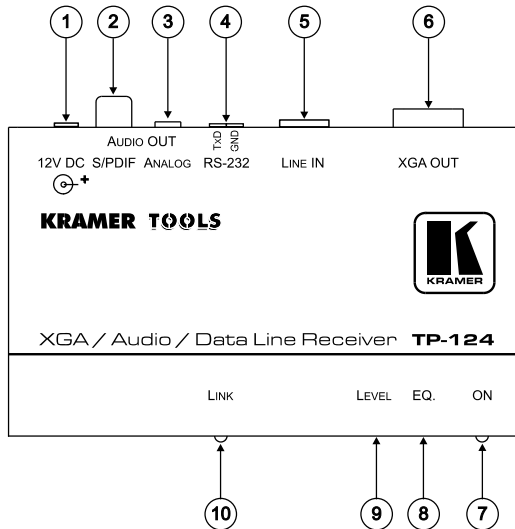


Figure 7: TP-124 XGA / Audio / Data Line Receiver (Topside)

Table 7: TP-124 XGA / Audio / Data Line Receiver (Topside) Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	AUDIO OUT	S/PDIF RCA connector Connects to the digital audio acceptor
3		ANALOG 3.5mm Mini Jack Connects to the analog audio acceptor
4	RS-232 Terminal Block Connector	Connects to the controlled unit
5	LINE IN RJ-45 Connector	Connects to ¹ the LINE OUT RJ-45 connector on the TP-121 XGA / Audio Line Transmitter or TP-104 XGA Line Transmitter / DA
6	XGA OUT HD15F Connector	Connect to the XGA acceptor
7	ON LED	Illuminates when receiving power
8	EQ. ² Trimmer	Adjusts ³ the cable compensation equalization level
9	LEVEL Trimmer	Adjusts ³ the output signal level
10	LINK LED	Illuminates when receiving the correct input signal

1 Using a UTP cable with CAT 5 connectors at both ends (the PINOUT is defined in Table 8 and Figure 9)

2 Degradation and VGA/XGA signal loss can result from using long cables (due to stray capacitance), sometimes leading to a total loss of sharpness in high-resolution signals

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

8 Connecting the XGA / Audio Line Transmitter / Receiver

You can use the **TP-121** and **TP-122** to configure an *XGA/Audio Line-to-Twisted Pair Transmitter and Receiver* system.

To connect the **TP-121 XGA / Audio Line Transmitter** with the **TP-122 XGA / Audio Line Receiver**, as the example in Figure 8 illustrates, do the following:

1. On the **TP-121**, connect the XGA source (for example, a laptop's graphics card) to the XGA INPUT HD15F connector and an audio source to the AUDIO IN 3.5mm mini jack, for example, using a Kramer C-GMA/GMA cable (VGA HD15M +Audio jack to VGA HD15M +Audio jack)¹. Alternatively, you can connect an XGA source to the XGA INPUT HD15F connector, and a separate audio source to the AUDIO IN 3.5mm mini jack.
2. On the **TP-122**, connect the XGA OUT HD15F connector to the XGA acceptor (for example, a display), and connect the AUDIO OUT S/PDIF RCA connector to the digital audio acceptor (for example, an AV Receiver), and the ANALOG 3.5mm mini jack to the analog audio acceptor (for example, a stereo audio recorder).
3. Connect the LINE OUTPUT RJ-45 connector on the **TP-121** to the LINE IN RJ-45 connector on the **TP-122**, via UTP cabling (with a range of more than 300ft (>100m)), see section 8.1.
4. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity on both² the **TP-121** and the **TP-122**. The signal from the XGA source is transmitted via CAT5 cable, decoded and converted at the XGA OUT HD15F connector to the XGA acceptor.
5. On the **TP-122**:
 - Adjust³ the video output signal level and/or cable compensation equalization level, if required
 - If necessary, set the H SYNC and V SYNC switches⁴, on the underside

¹ Not supplied. The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

² If you cannot connect the power to both the TP-121 and TP-122, you can just connect the power to the TP-122

³ Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

⁴ By default, both switches are set down (for negative V SYNC and H SYNC polarity)

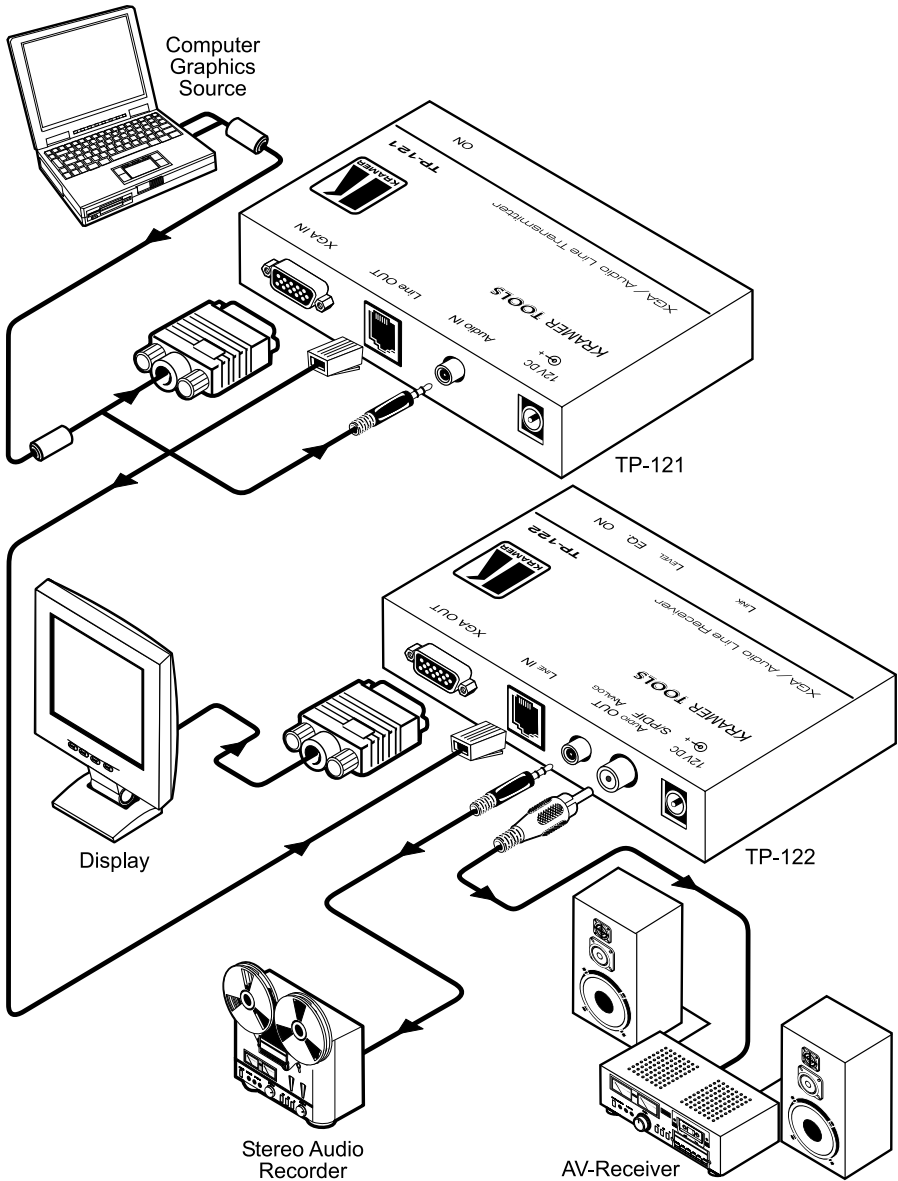


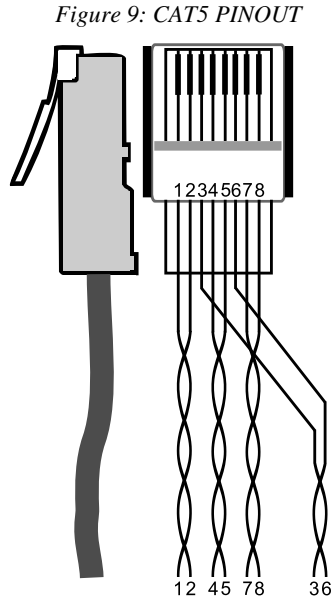
Figure 8: Connecting the XGA / Audio Line Transmitter / Receiver System

8.1 Wiring the CAT5 LINE IN / LINE OUT RJ-45 Connectors

Table 8 and Figure 9 define the UTP CAT5 PINOUT, using a straight pin to pin cable with RJ-45 connectors:

Table 8: CAT5 PINOUT

EIA / TIA 568A		EIA / TIA 568B	
PIN	Wire Color	PIN	Wire Color
1	Green / White	1	Orange / White
2	Green	2	Orange
3	Orange / White	3	Green / White
4	Blue	4	Blue
5	Blue / White	5	Blue / White
6	Orange	6	Green
7	Brown / White	7	Brown / White
8	Brown	8	Brown
Pair 1		Pair 1	4 and 5
Pair 2		Pair 2	3 and 6
Pair 3		Pair 3	1 and 2
Pair 4		Pair 3	3 and 6
		Pair 4	7 and 8



9 Connecting the XGA / Audio / Data Line Transmitter / Receiver

You can use the **TP-123 XGA / Audio / Data Line Transmitter** and the **TP-124 XGA / Audio / Data Line Receiver** to configure a twisted pair transmitter and receiver system, to transmit the video, audio and RS-232 control signals via CAT5 UTP cable.

To connect the **TP-123** and the **TP-124** to configure a twisted pair transmitter and receiver system, as the example in Figure 10 illustrates, do the following:

1. On the **TP-123**, connect:
 - An XGA source (for example, a laptop's graphics card) to the XGA IN HD15F connector and an audio source to the Audio IN 3.5mm mini jack, for example, using a Kramer C-GMA/GMA cable (VGA HD15M +Audio jack to VGA HD15M +Audio jack)¹
 - An RS-232 cable with a DB9 connector at one end to the laptop, and a 2 PIN terminal block connector at the other end to the **TP-123** RS-232 port²
2. On the **TP-124**, connect:
 - The XGA OUT HD15F connector to a Display
 - The S/PDIF Audio OUT RCA connector to a digital AV Receiver (leave the ANALOG Audio OUT 3.5mm mini jack unconnected)
 - An RS-232 cable with a 2 PIN terminal block connector at one end to the **TP-124** RS-232 port², and a DB9 connector at the other end to the RS-232 port on an RS-232 controllable device (for example, a switcher)
3. Connect the Line OUT RJ-45 connector on the **TP-123** to the LINE IN RJ-45 connector on the **TP-124**, via UTP cabling³ (with a range of more than 300ft (>100m)).
4. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity on both⁴ the **TP-123** and the **TP-124**.
5. On the **TP-124**:
 - Adjust⁵ the video output signal level and/or cable compensation equalization level, if required
 - If necessary, set the H SYNC and V SYNC switches⁶, on the underside

1 Not supplied. The full list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>. Alternatively, you can connect an XGA source to the XGA IN HD15F connector, and a separate audio source to the AUDIO IN 3.5mm mini jack

2 As defined in Figure 11 and Table 9 (see section 8.1)

3 For details of how to wire a CAT5 LINE IN / LINE OUT RJ-45 connector, see section 8.1

4 If you cannot connect the power to both the TP-123 and TP-124, you can just connect the power to any one unit

5 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

6 By default, both switches are set down (for negative V SYNC and H SYNC polarity)

Connecting the XGA / Audio / Data Line Transmitter / Receiver

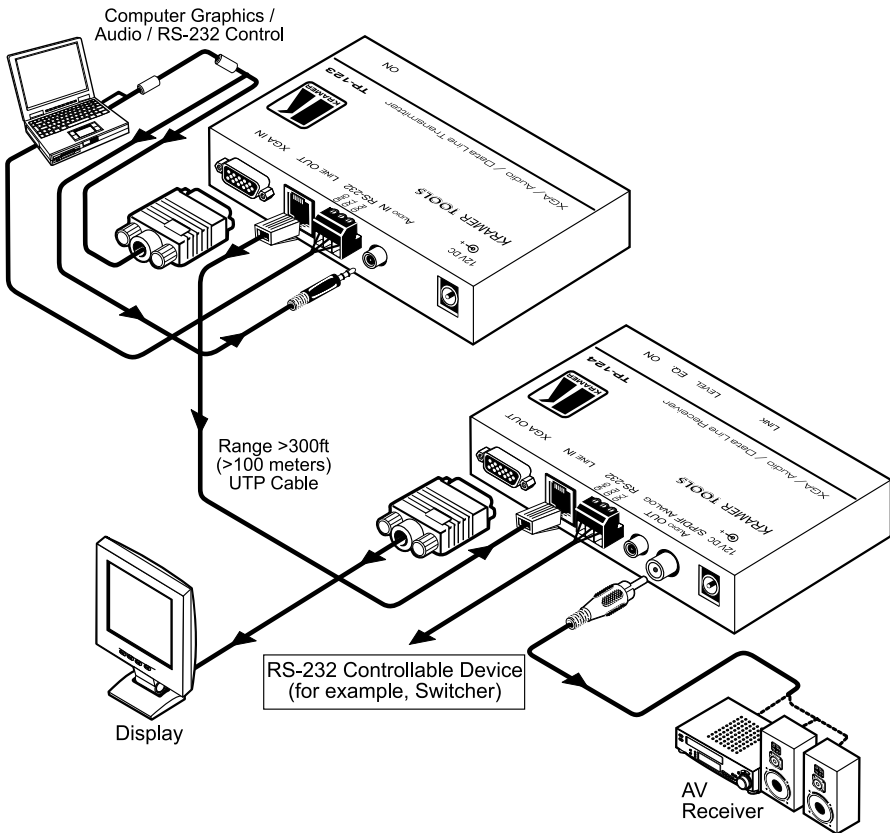


Figure 10: Connecting the XGA / Audio / Data Line Transmitter / Receiver System

9.1 Controlling via RS-232 (for example, using a PC)

Prepare an RS-232 cable with a DB9 connector at one end, and a 2 PIN terminal block connector at the other end, as defined in Figure 11 and Table 9:

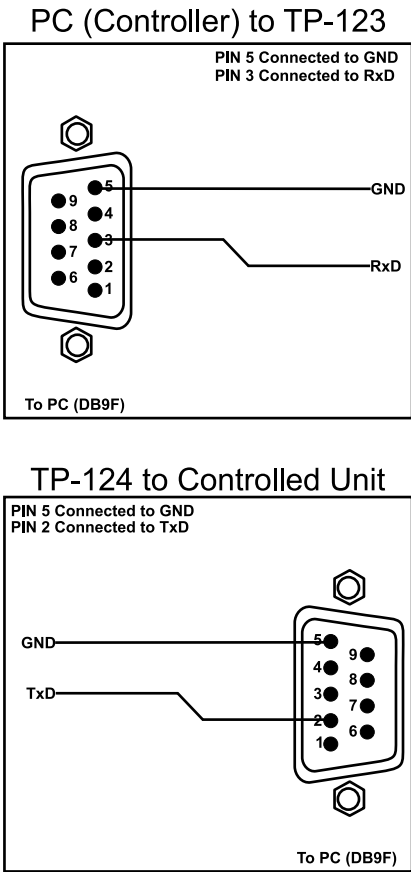


Figure 11: RS-232 PINOUT Connection

Table 9: RS-232 PINOUT Connection

Connect this PIN on the Terminal Block Connector:	To this PIN on the DB9 Connector
TxD	PIN 2
RxD	PIN 3
GND	PIN 5

10 Configuring a 1:4 XGA to TP Transmitter / Receiver / DA

You can use the **TP-104 XGA Line Transmitter / DA** with the **TP-120 XGA Line Receiver**¹ to configure a 1:4 XGA-to-Twisted Pair DA system.

To connect the **TP-104** to four **TP-120** units, as the example in Figure 12 illustrates, do the following:

1. On the **TP-104**, connect the XGA source (for example, a computer graphics source) to the XGA INPUT HD15F connector, and connect the line output RJ-45 connector²:
 - OUT 1 to the LINE IN RJ-45 connector on the **TP-120** Unit I
 - OUT 2 to the LINE IN RJ-45 connector on the **TP-120** Unit II
 - OUT 3 to the LINE IN RJ-45 connector on the **TP-120** Unit III
 - OUT 4 to the LINE IN RJ-45 connector on the **TP-120** Unit IV
2. On the four **TP-120** units, connect the:
 - XGA OUT HD15F connector of Unit I to the XGA acceptor (for example, Display 1)
 - XGA OUT HD15F connector of Unit II to the XGA acceptor (for example, Display 2)
 - XGA OUT HD15F connector of Unit III to the XGA acceptor (for example, Display 3)
 - XGA OUT HD15F connector of Unit IV to the XGA acceptor (for example, Display 4)
3. On each of the five Kramer TOOLS, connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity. The signal from the XGA source is transmitted via the four CAT5 cables, decoded and converted at the each of the XGA OUT HD15F connectors to the XGA acceptors.
4. On each of the five Kramer TOOLS:
 - Adjust³ the video output signal level and/or cable compensation equalization level, if required
 - If necessary, on the **TP-120** units, set the H SYNC and V SYNC switches⁴, on the underside

1 Refer to the separate user manual: PT-110, WP-110, TP-120, which can be downloaded from the Internet at this URL: <http://www.kramerelectronics.com>

2 Via UTP cabling (with a range of more than 300ft (>100m)). For details of how to wire a CAT5 LINE IN / LINE OUT RJ-45 connector, see section 8.1

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

4 By default, both switches are set down (for negative V SYNC and H SYNC polarity)

Configuring a 1:4 XGA to TP Transmitter / Receiver / DA

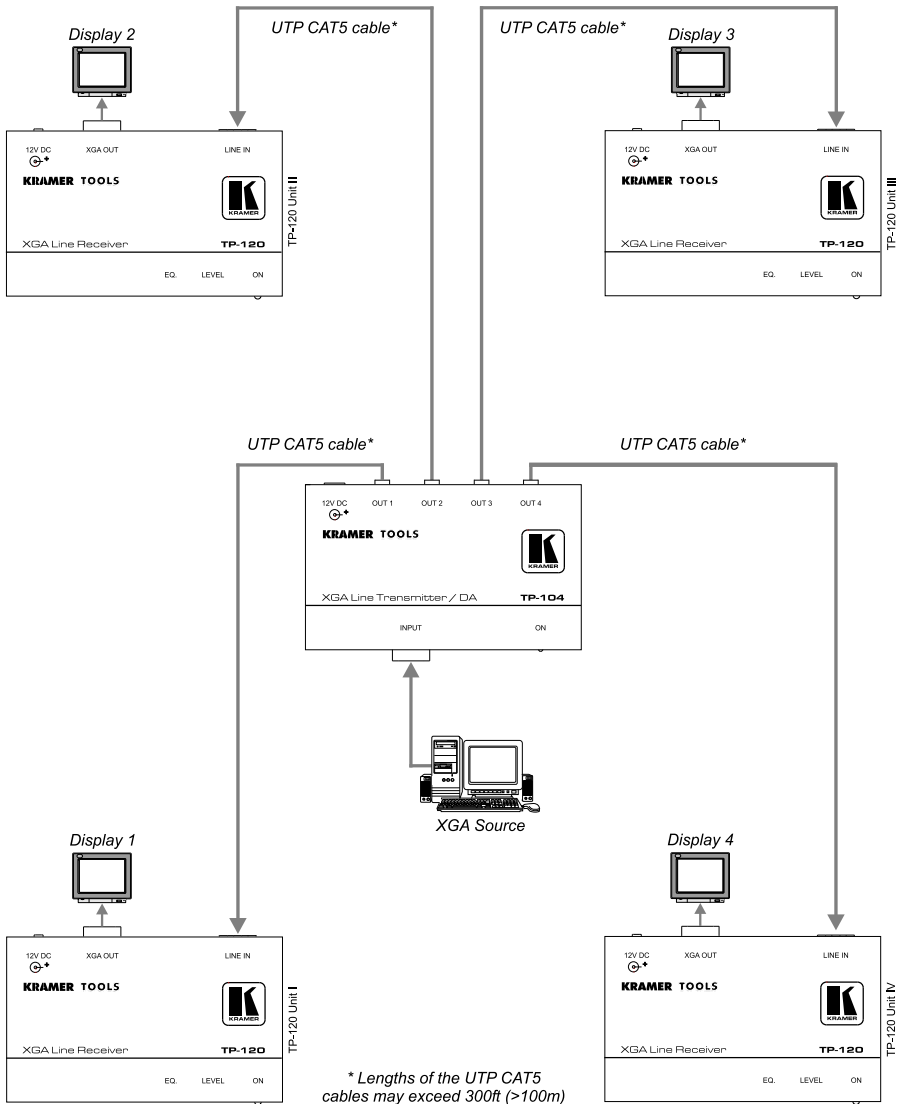


Figure 12: Configuring a 1:4 XGA to Twisted Pair Transmitter / Receiver / DA

11 Configuring a TP-105 CAT5 Line Driver / DA

You can connect the **TP-105 CAT5 Line Driver / DA**—using a **PT110 XGA Line Transmitter** and two **TP-120 XGA Line Receiver**¹ units—to transmit a computer graphics signal to two displays via long line CAT5 UTP cabling.

To connect the **TP-105**, as the example in Figure 12 illustrates, do the following:

1. On the **PT110**, connect the:
 - Computer graphics source to the XGA INPUT HD15F connector
 - LINE OUTPUT RJ-45 connector² to the INPUT RJ-45 connector on the **TP-105**
2. On the **TP-105**, connect the:
 - OUT 1 RJ-45 connector to the LINE IN RJ-45 on the first **TP-120**
 - OUT 2 RJ-45 connector to the LINE IN RJ-45 on the second **TP-120**
3. On the two **TP-120** units, connect the:
 - XGA OUT HD15F connector on the first **TP-120** unit to the XGA acceptor (for example, Display 1)
 - XGA OUT HD15F connector on the second **TP-120** unit to the XGA acceptor (for example, Display 2)
4. On each of the four Kramer units, connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity.
The signal from the XGA source is transmitted via the two CAT5 cables, decoded and converted at the each of the XGA OUT HD15F connectors to the XGA acceptors.
5. If necessary:
 - Adjust³ the video output signal level and/or cable compensation equalization level on the **TP-105** and on both the **TP-120** units
 - Set the H SYNC and V SYNC switches⁴ on the underside of the **TP-120** units

1 Refer to the separate user manual: PT-110, WP-110, TP-120, which can be downloaded from the Internet at this URL: <http://www.kramerelectronics.com>

2 Via UTP cabling (with a range of more than 300ft (>100m)). For details of how to wire a CAT5 LINE IN / LINE OUT RJ-45 connector, see section 8.1

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

4 By default, both switches are set down (for negative V SYNC and H SYNC polarity)

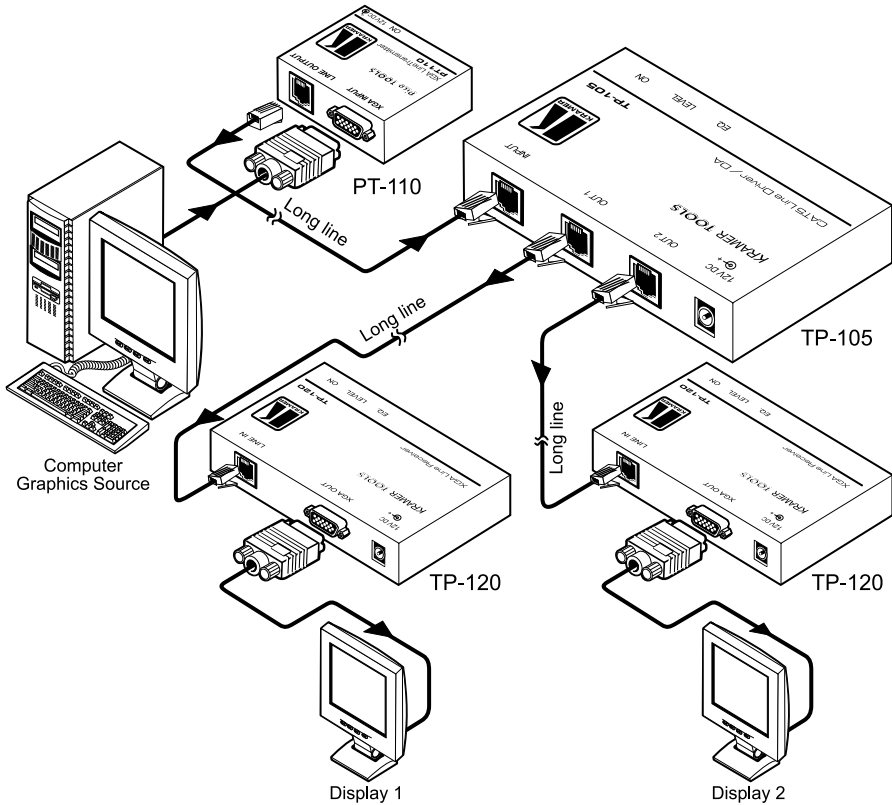


Figure 13: Configuring a TP-105 CAT5 Line Driver / DA

12 Technical Specifications¹

Table 10 includes the technical specifications of the **TP-104**, Table 11 includes the technical specifications of the **TP-105**, and Table 12 includes the technical specifications of the **TP-121**, **TP-122**, **TP-123**, and **TP-124**:

Table 10: Technical Specifications of the TP-104 (with 60m CAT5 cable)

	TP-104
INPUTS:	1 VGA / UXGA on an HD15 connector
OUTPUTS:	4 RJ-45 OUT connectors
MAX. OUTPUT LEVEL:	1.4Vpp
BANDWIDTH (-3dB) ² :	>150MHz
DIFF. GAIN ² :	3.2%
DIFF. PHASE ² :	0.5 Deg
K-FACTOR ² :	<0.05%
S/N RATIO ² :	80dB
CONTROLS ² :	EQ.: 0 to 33dB; LEVEL: -7.5dB to 4.4dB
COUPLING ² :	AC
POWER SOURCE:	12 VDC 180mA
DIMENSIONS:	12cm x 7.5cm x 2.5cm (4.7" x 2.95" x 0.98", W, D, H)
WEIGHT:	0.3 kg. (0.67 lbs.) approx.
ACCESSORIES:	Power supply

Table 11: Technical Specifications of the TP-105 (with 60m CAT5 cable)

	TP-105
INPUTS:	1 RJ-45 OUT connector
OUTPUTS:	2 RJ-45 OUT connectors
MAX. OUTPUT LEVEL:	1.6Vpp
BANDWIDTH (-3dB) ³ :	Appropriate for VGA-UXGA
DIFF. GAIN ³ :	3.7%
DIFF. PHASE ³ :	0.5 Deg
K-FACTOR ³ :	<0.05%
S/N RATIO ³ :	69dB
CONTROLS ³ :	EQ.: 0 to 4.4dB @ 50MHz; LEVEL: -5.5dB to 1.4dB
COUPLING ³ :	AC
POWER SOURCE:	12 VDC 220mA
DIMENSIONS:	12cm x 7.5cm x 2.5cm (4.7" x 2.95" x 0.98", W, D, H)
WEIGHT:	0.3 kg. (0.67 lbs.) approx.
ACCESSORIES:	Power supply

¹ Specifications are subject to change without notice

² For the TP-104 Transmitter/ TP-120 Receiver SETUP

³ For the PT-110 to TP-105 to TP-120 Receiver SETUP

Technical Specifications

Table 12: Technical Specifications of the TP-121 / TP-122 / TP-123 / TP-124

	TP-121	TP-122	TP-123	TP-124
INPUTS:	VIDEO: 1 VGA / UXGA on an HD15 connector AUDIO: 1 audio ANALOG 3.5mm mini jack	1 RJ-45 LINE IN connector	VIDEO: 1 VGA / UXGA on an HD15 connector AUDIO: 1 audio ANALOG 3.5mm mini jack	1 RJ-45 LINE IN connector
OUTPUTS:	1 RJ-45 OUT connector	VIDEO: 1 VGA / UXGA on an HD15 connector AUDIO: 1 audio S/PDIF RCA connector 1 audio ANALOG 3.5mm mini jack	1 RJ-45 OUT connector	VIDEO: 1 VGA / UXGA on an HD15 connector AUDIO: 1 audio S/PDIF RCA connector 1 audio ANALOG 3.5mm mini jack
MAX. OUTPUT LEVEL:		VIDEO: 1V AUDIO: 2.5V		VIDEO: 1V AUDIO: 2.5V
CONTROLS:		Level: -7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz	RS-232 2 PIN Terminal Block	RS-232 2 PIN Terminal Block Level: -7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz
BANDWIDTH (-3dB) ¹ :	AUDIO: 20Hz – 20kHz@0.5dB			
S/N RATIO:	AUDIO: <-80dB			
TOTAL GAIN:	AUDIO: Analog/analog: 0dB Analog/SPDIF: -12dBFS			
COUPLING:	AC			
TND+N:	AUDIO: <0.01%			
POWER SOURCE:	12 VDC 60mA			
DIMENSIONS:	12cm x 7.5cm x 2.5cm (4.7" x 2.95" x 0.98", W, D, H)			
WEIGHT:	0.3 kg. (0.67 lbs.) approx.			
ACCESSORIES:	Power supply			

¹ For the Transmitter/Receiver pair

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed.
3. Damage, deterioration or malfunction resulting from:
 - i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
 - ii) Product modification, or failure to follow instructions supplied with the product
 - iii) Repair or attempted repair by anyone not authorized by Kramer
 - iv) Any shipment of the product (claims must be presented to the carrier)
 - v) Removal or installation of the product
 - vi) Any other cause, which does not relate to a product defect
 - vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer. This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC Rules and Regulations: Part 15: "Radio frequency devices Subpart B – Unintentional radiators"

CAUTION!

- ☒ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- ☒ Use the supplied DC power supply to feed power to the machine.
- ☒ Please use recommended interconnection cables to connect the machine to other components.



For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found. We welcome your questions, comments and feedback.



Caution

Safety Warning:

Disconnect the unit from the power supply before opening/servicing.



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P/N: 2900-000037 REV 3